Yarmouk University
Faculty of Economics and Administrative Sciences
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"A Credit Rating for Jordanian Commercial Banks"

"تصنيف ائتماني للبنوك التجارية الاردنية "

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" A Credit Rating for Jordanian Commercial Banks "

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الاهــــــــداء

الى الخيمة التي تظللني والغيمة التي تمطرني حباً وصبراً وانتظاراً الي أمي وأبي....

الى الناطرين في دروب الأمل ومنارات الطريق الى اللذين سواعدهم تمرجحني وتأخذني بعيداً الى إخوتي....

الى اللذين يعزفون على اوتار لحن العمر وتحلوا الاوقات بأنغامهم الى اصدقائي ....

الى التي تحملت مشاكساتي وأودعتني الى يقيني بصبر وأنات الى مشرفتي الدكتورة العزيزة ديما الربضي ....

الى اللذين ابدأ معهم نهاري في صباح الخير وأغادرهم بالخير الى زملائي....

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Abstract

Rand Sameer Hamarneh. A Credit Rating for Jordanian Commercial Banks, Department of Finance and Banking Sciences, Yarmouk University, 2014 (Supervisor: Dr. Dima Waleed Hanna Alrabadi).

This study investigates the factors that affect the credit ratings of the Jordanian commercial banks over the period (2000-2013) by using an ordered probit model. Moreover, the study estimates a forecasted credit rating of the banks investigated. The results show that profitability ratios, asset quality ratios, liquidity ratios, capital adequacy ratios and the size of the bank have statistically significant effects on the banks credit ratings. The forecasted credit rating puts the Arab Bank, the Housing Bank for Trade and Finance and the Jordan Ahli Bank as the first three banks in Jordan in terms of their credit worthiness.

Key Words: Credit Rating, Jordanian Commercial Banks, Ordered Probit Model, Amman Stock Exchange, Profitability Ratios, Asset Quality Ratios, Liquidity Ratios, Capital Adequacy Ratios .

Chapter one

General Framework

Chapter one
General Framework

1.1 Introduction

Credit rating agencies have been around for the better part of the 20th century. Credit rating agencies (CRAs) give a rating scale of risks associated with the ability of banks to meet debt obligations on time. These ratings are used by investors, borrowers, issuers and governments in making investment and financial decisions. Consequently, changes in ratings lead to important changes in capital allocation. The three major rating agencies worldwide are Standard & Poor's (established in 1906), Moody's (established in 1909) and Fitch (established in 1913) (Gogas *et al.*,2013).

The implementation of Basel II strengthened the demand for ratings and expanded the role of the CRAs. Also in 1988, the Basel Committee proposed the CAMEL framework for assessing financial institutions, based on the evaluation of five critical elements of a financial institution's operations: Capital adequacy, Asset quality, Management soundness, Earnings and profitability, and Liquidity (Dash& Das ,2013).

In 1997, a sixth component has been added , Sensitivity to market risk, in order to form the CAMELS framework (Gilbert *et al*., 2000).

Under the CAMELS framework, financial institutions are required to enhance capital adequacy, strengthen asset quality, improve management, increase earnings, maintain liquidity, and reduce sensitivity to various financial risks. The rating agencies play an important role in the pricing of credit risk. However, their integrity has been under consideration due to cases such as Enron (USA,2001) and Lehman Brothers (USA,2008) which had been assessed, by the rating agencies, with high ratings just a few days before their collapses. For this reason, they are often blamed for not being able to provide the market with the appropriate ratings required for important investment decisions. Such cases also occurred during the global financial crisis of 2008 and turn the interest in credit rating methodologies.“It is generally accepted that when the credit rating of a bank is downgraded from the CRAs then things get worse for the specific banking institution and vice versa” (Gogas *et al*., 2013).

Rating agencies have established themselves internationally and they are viewed as being more credible than domestic rating agencies in most countries. Credit ratings that are paid for and initiated by issuers are

commonly known as solicited ratings. There are numerous advantages of credit agencies. First, they help good institutions get better rates; institutions with higher grade credit ratings are able to borrow money at more favorable interest rates. Accordingly, this rewards organizations that are responsible about managing their money and paying off their debt. In turn, they will be able to expand their business at a faster rate, which helps stimulate the economy's expansion as well. Second, they warn investors of risky companies. Third, they provide a fair risk-return ratio, not all investors are opposed to buying risky debt securities. However, they want to know that they are going to be rewarded if they take on a high level of risk. For this reason, credit rating agencies will inform them of the risk levels for every debt instrument and help ensure that they are properly compensated for the level of risk they take. Finally they give institutions an incentive to improve, thus, a poor credit rating can be a wake-up call for institutions that have taken on too much debt or haven't demonstrated that they are willing to be responsible about paying it back. These institutions are often in denial of their credit problems, and need to be alerted of any potential problems from an analyst before they make the necessary changes. However, there are disadvantages of credit rating agencies, like

evaluation is sometimes highly subjective, there can be conflict of interests, and ratings are not always accurate (Poon et al.,2005).

This study aims to determine the factors that affect the credit ratings of the Jordanian commercial banks over the period (2000-2013) and estimates a forecasted credit rating for them. Thus, it sheds a light on the performance of these banks in terms of their profitability, liquidity, solvency and many other important factors. Additionally, it provides academicians and practitioners with a credit score of each bank.

1.2 Objectives of the Study

The purpose of this study is to present an empirical model designed to execute credit ratings for the Jordanian commercial banks for a period of fourteen years from 2000 to 2013.Moreover, the study focuses on the factors that affect the credit ratings of banks including profitability, asset quality, capital adequacy, age, size and liquidity.

1.3 Importance of the Study

Credit rating is a vital issue that concerns investors in order to take the right decision to invest or not, depositors to increase their confidence in the banks they deal with, managers to enhance the performance of those

banks which they operate and the regulatory body specifically the central bank to ensure the creditability of the banking system. The importance of this study comes as being (to the best of research's knowledge) the first study in Jordan that executes a credit rating for the commercial banks over a relatively long period of time (2000-2013).

1.4 Problems of the Study

The research problem can be expressed in the two following questions:

1. Can profitability, asset quality, liquidity, capital adequacy, size and age be used as effective variables to predict the credit rating for Jordanian Commercial Banks?

2. Which Jordanian Commercial Banks have the higher forecasted credit rating?

1.5 Structure of the Study

The structure of this thesis is as follows: chapter one provides an introduction of the study. Chapter two provides a theoretical background of Credit Ratings . Chapter three reviews the related literature. Chapter four explains research methodology and related variables. Chapter five presents the results and discussion. Chapter six documents the conclusions of the study and presents its main recommendations.

Chapter Two

Theoretical Background

Chapter Two
Theoretical Background

2.1 Introduction

This chapter presents the elementary concepts of credit ratings and explains what credit ratings are , clarifies who uses them ,and shows the rise of the credit rating agencies, then it provides an overview of how rating agencies mainly assess both business risk and financial risk.

2.2 Credit ratings

Credit ratings are concepts about credit risk [1]. Credit ratings are the agency's opinion about the ability and readiness of an issuer, such as a firm or state or city government, to face its financial obligations in full and on time (Standard & Poor's ,2011). Credit ratings can also express the credit quality of an individual debt issue, for example a corporate or municipal bond, and the relative probability that the issue might default. Ratings are provided by credit rating agencies which specialize in evaluating credit risk. There are regional and niche international credit

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[1] Credit risk indicates the volatility of losses on credit exposures in two forms: the loss in the earnings from the credit and the loss in the value of the credit asset.

rating agencies, like Fitch ,Standard & Poor's and Moody's that tend to specialize in a geographical region or industry. Each agency uses its own methodology in measuring creditworthiness and applies a specific rating scale to publish its ratings opinions. Usually, ratings are expressed as letter grades that range, for instance, from 'AAA' to 'D' to communicate the agency's opinion of relative level of credit risk. (Standard & Poor's ,2011)

Credit ratings are forward looking. Rating agencies evaluate historical and available current information and assess the potential impact of predictable future events. For instance, in rating a corporation as an issuer of debt, the agency could factor the anticipated ups and downs in the business cycle that may affect the corporation's creditworthiness. While the forward looking opinions of rating agencies can be of use to market participants and investors who are making short-term or long-term investment and business decisions. Credit ratings are not a guarantee that an investment will pay out or that it will not default (Standard & Poor's,2011).

2.3 Credit rating scales

"Credit rating agencies summarize their opinions about obligors in ratings that are graded symbols, such as AA-,BBB+, or Caal. Each symbol represents a group within which the credit risk characteristics

are broadly the same. The first such symbolic heuristic was used by Moody's in 1909." (Langohr, H., & Langohr, P. ,2010) .There are many ways to classify ratings and each CRA maintains its own set of rating systems. Within their systems, most CRAs differentiate between issuer ratings and instrument ratings. An issuer rating rates the issuer as a whole, despite of the particular debt instrument. For instance, an Issuer Credit Rating from Standard &Poor's is not specific to any particular financial obligation, because it does not take into account any particular obligation, rather it provides an overall assessment of a company's creditworthiness. In the special world of money, derivatives , securities, interest rate, foreign exchange, and commodities trading, an issuer rating is known as a counterparty risk rating. Counterparty risk is the risk that the counterparty to a financial contract will not meet the terms of the contract. On the other hand, an instrument rating deals with the performance of one particular instrument. Its primary point is to assess the ability of the issuer to deliver on the terms of the specific security it has issued. Instrument ratings combine the risk of default and the expected loss-given-default. Such a fully secured bond issue will probably carry a higher credit rating than a subordinated debenture from the same issuer, since the investor holding the secured bond is more likely to receive all of the scheduled interest and principal payments in

the event of bankruptcy. The subordinated debenture holder would normally receive such payments only after all secured bondholders are paid (Langohr, H., & Langohr, P. ,2010).

Long-term ratings give an opinion of the credit-worthiness of an issuer or an instrument over a time horizon that extends three to five years in the future. Short-term ratings which are provided for the short-term financial instruments market, are mainly concerned with the coming year. Short-term ratings use a smaller rating scale than long-term ratings, although both types of rating assess the possibility of default over the full period to maturity. (Langohr, H., & Langohr, P. ,2010)

The fundamental ordinal credit rating scale is defined as a rating expresses an opinion on the relative credit strength of an issuer or an instrument over its lifetime. The special characteristic of this credit rating scale is its ordinality. The ordinality implies that all ratings along this scale are comparable. Rating agencies, especially the global ones, work purposefully hard to reach consistency across all classes of issuers, industries, regions , and instruments. Thus, the same scale is used for corporate bonds, sovereigns, notes, financial institutions, and structured finance instruments. Since the beginning of the subprime mortgage related crisis, there are extensive discussions as to whether structured

finance instruments should be rated on a different scale. This very wide consistency of the rating scale is essential for the utility of ratings to global investors. (Langohr, H., & Langohr, P., 2010)

2.4 Users of credit ratings

Several parties are interested in credit ratings as follows:

1. Investors

Investors most often utilize credit ratings to compare debt issues and different issuers when managing their portfolios and making investment decisions and to help assess credit risk. Individual investors, from a risk tolerance perspective, may employ credit ratings in evaluating the purchase of a corporate or municipal bond. Institutional investors, such as banks, mutual funds, insurance companies , and pension funds often increment their own credit analysis of specific debt issues by using credit ratings. Additionally, credit ratings are used by institutional investors to establish beginning for credit risk and investment guidelines. A rating could be used as a signal of credit quality, but investors should consider a diversity of factors, plus their own analysis (Standard & Poor's, 2011).

2. Intermediaries

Investment bankers help to facilitate the flow of capital from investors to issuers. credit ratings are used by investment bankers to benchmark the relative credit risk of dissimilar debt issues, as well as to put the initial pricing for individual debt issues they structure and to help find out the interest rate these issues should pay. Entities and Investment bankers that structure special types of debt issues may look to a rating agency's criteria when making their own decisions about how to arrange different debt issues, or different tiers of debt. Investment bankers may also serve as arrangers of special debt issues (Standard & Poor's, 2011).

3. Issuers

Issuers, including financial institutions, corporations, national governments, states, cities and municipalities, employ credit ratings to provide independent views of their creditworthiness and the credit quality of their debt issues. Issuers may also make use of credit ratings to facilitate communicate the relative credit quality of debt issues, thus expanding the universe of investors. As well, credit ratings may help them anticipate the interest rate to be offered on their new debt issues. As a general rule, the more creditworthy an issuer or an issue is, the lower the interest rate the issuer would typically have to pay to attract

investors. The reverse is also correct: an issuer with lower creditworthiness will typically pay a higher interest rate to counterbalance the greater credit risk assumed by investors (Standard & Poor's, 2011).

4. Businesses and financial institutions

Businesses and financial institutions, particularly those concerned in credit-sensitive transactions, may assess counterparty risk using credit ratings, which is the potential risk that a party to a credit agreement may not fulfill its obligations. For instance, in deciding whether to select a company that will guarantee the repayment of a debt issue in the event of default or in lending money to a particular organization, a business may wish to consider the counterparty risk. A credit rating agency's view of counterparty risk can therefore assist businesses analyze their credit exposure to financial firms that have agreed to assume certain financial obligations and to evaluate the viability of potential partnerships and other business relationships (Standard & Poor's, 2011).

2.5 The Rise of The Credit Rating Agencies

The foundations that are now supplied by credit rating agencies were provided in the 19th century by three types of institutions: the specialized business and financial press, credit reporting agencies, and investment bankers. The specialized business press reported about business conditions for companies and industry sectors. The American Railroad Journal was the first, appeared in 1832. Henry Varnum Poor became its editor in 1849, and later went on to publish Poor's Manual of the Railroads of the United States. In 1916, the Poor Company entered the bond rating business, and in 1941 merged with Standard Statistics to form S&P. Credit Reporting (not rating) agencies estimated the ability of merchants to pay their financial obligations. The first merchant credit agency was founded in New York in 1841. Robert Dun acquired the agency and then published the first creditworthiness guide in 1859. John Bradstreet founded a similar agency in 1849 and published his first credit guide in 1857. The two businesses were unified into Dun & Bradstreet (D&B) in 1933, and in 1962, D&B obtained Moody's Investor Services, combining credit rating and reporting before splitting up again in 2000 (Langohr, H., & Langohr, P., 2010).

The first credit rating agency (CRA) was established by John Moody in 1909 and combined the reporting and rating functions in a single business, establishing the foundation of the CRA industry. There have been four major growth phases in the CRA industry. The first phase lasted from 1909 to 1943. The First World War and the prosperous 1920s led to a large number of private and public issues. The 1930s saw the first regulatory uses of credit ratings and the increase of bond markets lasted till the end of the Second World War. The second phase (1944-1969), the era after the Second World War, was one of economic and financial stability. As a result, bond ratings were not as relevant during this period, and leading agencies actually employed only a few analysts each, with revenues coming from the sale of research reports to investors. The third phase was characterized by major real shocks from 1970 through 2001. Through this time, the global financial system became market-based, moving from fixed to flexible exchange rates, from quantitative credit controls to price- based money supply management, and from price control to market pricing. The regulation of financial institutions shifted from business of functional competition among all market participants, and business funding from institutions to markets. The fourth phase of CRA industry development, from 2002 to present time, is characterized by important changes in the industry itself,

along with continued expansion. Changes are driven by a spate of unexpected corporate bankruptcies, the tremendous growth of the structured finance market, and the rapid adoption of the Internet as a powerful force for infomediaries, including CRAs. All at once, capital market instruments have become increasingly pervasive and complex. Since the range of issuers, securities, and investors have expanded, ratings have become increasingly more relevant to the savings investment process through the capital markets. The faster expansion of ratings outside rather than inside the US creates demanding management challenges for traditionally US-based business (Langohr, H., & Langohr, P., 2010).

2.6 The Current Structure of the Industry

The main US agencies have all established operations and joint ventures abroad to meet capital markets globalization, and the rising importance of credit ratings in markets outside the US. The most striking feature of the industry today is that over 80% of all rated issues outstanding are in the hands of just two CRAs, namely Moody's , S&P and Fitch, with a market share of 14%, is a distant third (Langohr, H., & Langohr, P., 2010).

Today, the industry can best be described as an oligopoly of three dominant global credit rating agencies, with a competitive edge of specialized agencies. By 2000, each of the three leading agencies serving the needs of international bond investors provided considerable coverage of most categories of issuers around the world. CRAs are differentiated along several dimensions: the extent and type of coverage (geography and industry of issuer, instruments), methodology (statistical modeling or fundamental credit analysis), pricing model (issuer fee or subscription), type of scale (ordinal with actual probability of default/PD-estimation or cardinal with estimates of relative default probabilities), and size. The three dominant players-S&P, Moody's, and Fitch-follow a similar pattern: they are large, provide cross-industry, issuer and instrument specific ratings, and have a global focus. They take an analytical approach with committee reporting, use ordinal scales, and have an issuer-pays business model (Langohr, H., & Langohr, P., 2010).

The Rating Agencies mainly consider two types of risk: business risk and financial risk. Assessing business risk involves considering trading conditions, the quality of the management team ,and the outlook for the industry . Financial risk is evaluated in a more quantitative way using accounting data looking at debt levels, profitability, and the financial

strength of the firm. Then, the analysts visit the company, a committee meet to consider the analyst's recommendations and vote on the final grade assigned. The company is informed of the recommendation and the commentary on it that will be published and then it is given a final chance to provide additional information before the rating is confirmed and published. Once a rating has been given, the process moves to a surveillance mode where a separate team within the ratings agency is tasked with observing the developments within the company in order that there can be a timely change in the rating under any circumstances. The actual ratings are issued with plus or minus signs attached for all the grades between AA and CCC (Anderson, 2013).

In general the rating agencies analytical framework is divided into two main categories: business risk analysis and financial risk analysis.

2.7 Business risk analysis

Business risk indicates the likelihood that a company will have lower profits than expected, or that it will experience a loss rather than a profit (Christiansen et al.,2004). A company with a higher business risk should choose a capital structure that has a lower debt ratio to ensure that it can meet its financial obligations at all times. The Standard & Poor’s view of the general creditworthiness of an obligor is based on the

risk factors they consider to be related. Within the business analysis category the indicated factors are industry characteristics, competitive position, and management. The industry risk profile generally sets an upper limit on the rating for a participant in the industry: 'AAA' debt ratings are unlikely to be assigned to firms with the majority of their business in high risk industries. The character of the competition is different in different industries, and the factors analyzed are as well. Also, some factors may hold special importance for particular companies; for instance, an over dependence on one facility or product line can lower the credit rating. The business line is analyzed separately if a company operates in more than one industry. The final credit rating depends on the correlation between the industries involved. Also of importance here is the ability of the company to manage a diverse business effectively. Management is evaluated on two levels: the ability to successfully manage the company; and the attitude of the company toward risk (Christiansen et al.,2004).

Credit rating agencies take into consideration business risk profile which is one of the key components that build the credit rating of the agency. The key elements that comprise their assessment of a firm's business risk are economic moat analysis, and uncertainty analysis.

2.7.1 Economic Moat Rating

According to company risk, the estimation of a firm's economic moat is the most significant factor. The concept of an economic moat plays a very important role not only in the qualitative assessment of a firm's long-term cash generation potential, but also in the actual calculation and evaluation of the credit rating. Economic moat is a term used to express the sustainability of a company's future economic profits. Rating agencies define economic profits as returns on invested capital (ROICs), over and above their estimate of a firm's cost of capital, or weighted average cost of capital(WACC). Competitive forces in a free-market economy tend to erode at firms that make economic profits, because at last competitors concerned to those profits will employ strategies to capture some of those excess returns. Only firms with economic moats can stave off competitive forces for a long period. Rating agencies, such as Morningstar assign one of three economic moat ratings: narrow, wide, or none. The two major requirements for companies to get either a narrow or wide rating are: the prospect of earning above-average returns on capital; and some competitive edge that prevents these returns from quickly drift. To evaluate the sustainability of excess profits, the moat trend is having ongoing assessments by the analysts. A firm's moat trend is positive in cases

where they think its competitive advantage is growing stronger, stable where they don't expect changes to moat rating over the next several years, and negative when they see signs of deterioration. Analysts of rating agencies should examine any proposed changes to the economic moat ratings of their companies under analysis with senior managers in their equity research department. This level of accountability underscores the effect that the economic moat ratings have on the valuation and ratings processes, plus on the many services and products that rating agencies provide. What is also important is evaluating the competitive dynamics and moats specific to the industry in which the firm operates. Industry tests are communicated across the analyst department so they can always evaluate firms in similar industries (Morningstar ratings, 2009).

2.7.2 Uncertainty Analysis

Uncertainty Analysis of the credit rating agencies measures the predictability of future cash flows, based on the characteristics of the business. Their framework decomposes the uncertainty around company value into four simplified conceptual elements: operating leverage, range of sales, financial leverage, and contingent events. A number of industries require special adjustments to this formula, but the basic

framework remains focused on bounding the range of the long run cash generating value of the firm (Morningstar ratings ,2009).

2.8 Financial risk analysis

The examination of the financial risk profile depends on past financial statements including the income statement, balance sheet and cash flow statement. In order to provide annual statements with more recent information, in addition, rating agencies take into account the latest available temporary reports and available public or private documents. The issuer's financial risk profile is captured through a ratio-based rating model which allows for a reliable assessment of the issuer's financial situation. The analysis of the financial risk profile includes analyzing the profitability, the liquidity and the capital adequacy. Rating agencies initially pursue the analysis of profitability by evaluating the ability of the issuer to make ongoing and stable revenues. As well, they measure the efficiency of the issuer to create value and how rapidly such value can be created. Also, rating agencies might adjust the issuer's balance sheet, depending on the characteristics of different local accounting standards. The liability structure of the issuer illustrates the reliability of its business model and sensitivity with refinancing and funding sources in general. The analysis of liquidity and cash flow

focuses on the volume, stability and structure of cash flow generated by the issuer, besides its debt maturity profile and costs. The cash flow margin analysis provides a perceptive view on the efficiency of the issuer and the strengths underlying its business model. Also, volatility and reduction in cash flows might cause harm to the issuer's short and medium term financial flexibility. Besides, determining the issuer's long-term ability to carry its debt by debt coverage measures. Indications about past proportions of cash components realized by the issuer's total debts, is provided by the historic view on debt coverage (Morningstar Ratings, 2009).

Moreover, according to other rating agencies ,taking into consideration evaluating the financial risk, they score firms on different metrics. First, cash flow cushion, that gives insight into whether a company can meet its capital obligations well into the future. Adjustments are made to the firm's reported operating cash flow to get its cash available for servicing its obligations, and compare their forecasts for that cash to the company's future debt-related obligations, including interest and debt maturities (Morningstar Ratings, 2009).

Second, they use the solvency score, as they take several ratios to assess a firm's financial strength, including the firm's debt burden relative to

its cash flow and the size of firm's obligations, relative to its assets. Additionally, examining these ratios in past years, the analysts clearly predict the cash flows a company is likely to earn in the future, and consider how these balance sheet ratios will change over time. Moreover, to industry standard measures of profitability, such as returns on equity profit margins , they give attention on return on invested capital as a key metric in determining whether company's profits will benefit debt and equity holders. Focusing on returns on invested capital to evaluate companies for more than a decade, is particularly important to understand a firm's ability to generate returns on capital in excess of its cost of capital in order to precisely assess its prospects for meeting debt obligations. Finally, the quantitative distance to default measure ranks companies on the probability that they will tumble into financial distress. The measure treats a company's equity as a call option on the company's assets, with the total liabilities being the strike price. The more likely the company's asset value is to fall below the value of the firm's liabilities, the greater the probability of financial distress is. The distance to default expresses how many standard deviations split the current value of assets from the strike price (Morningstar Ratings, 2009).

Financial risk is generally measured quantitatively through the use of financial ratios. Benchmarks for these ratios differ greatly by industry, and adjustments are usually necessary. Guidelines are set for given ratios for levels of business risk, a company with a strong business profile can afford to take on added financial risk and still maintain the same credit rating (Morningstar Ratings, 2009).

2.9 Banks credit ratings

Rating agencies evaluate bank's credit risk which is a function of the financial and business risk on top of the probability of external support available to the bank in case of any financial stress. They make use of publicly available financial data also the bank's own statistical information for its credit assessment. Rating agencies make suitable adjustments to the financial data to ensure conformance with the generally accepted accounting principles. The key factors measured in the rating process that related to business risk are as follows:

2.9.1 Operating Environment

One of the important parameters for the credit risk evaluation of a bank, is the assessment of a bank's operating environment, as it could affect asset quality, growth and its earnings. The operating environment of a

bank is studied through an investigation of the prevailing economic conditions; the likely deposits and credit growth; growth prospects (GDP growth rate); structural constraints in the economy (such as a large fiscal deficit and the necessity of banks to invest in Statutory Liquidity Ratio (SLR)[2] papers) plus the impact of economic and regulatory environment on the credit risk profile. Rating agencies also appraise the possible policy changes to face these challenges. Additionally, political risks and the legal system of the country are also evaluated to appraise the asset quality of banks as well as their ability to recover from idler accounts. An estimation of the structure of the financial market; stages of development and intensity of competition forms an important part of the evaluation of a bank's operating environment (Moody's ratings,1999).

2.9.2 Regulatory Environment

The evaluation of the regulatory system includes the evaluation of the standards related to bank capital and other countercyclical measures to absorb risk, for example, banks are required to achieve and maintain a specific ratio of total capital funds to risk weighted assets .Moreover, the

[2] Statutory liquidity ratio (SLR) is the Indian government term for reserve requirement that the commercial banks in India require to maintain in the form of gold or government approved securities before providing credit to the customers. Statutory Liquidity Ratio is determined and maintained by Reserve bank of India in order to control the expansion of bank credit.

degree to which the central bank is probable to open the banking system to further disintermediation and allow new entrants in banking could raise competition from new banks and non-bank lenders. Further expansion of the capital market could allow potential and existing customers to access capital markets directly, therefore making product innovation an important measure for future performance. Accordingly, a well supervised and regulated system is the backbone for stability and credibility of banks(ICRA ratings, 2011).

2.9.3 Franchise

The franchise strength of a bank sets its capacity to grow while maintaining reasonable risk adjusted returns and flexibility of earnings. Rating agencies estimate the franchise strength of a bank in terms of performance and strengths relative to competition; complexity of key segments and special government support or privileges relative to other banks. In addition, they take into account the brand recognition, history and background of banks under its franchise strength analysis(Moody's ratings,1999).

2.9.4 Management Systems and Strategy

Some aspects that outline the foundation of a bank's credit risk profile are: quality of management; systems and policies; shareholder expectations; the strategy tracked to manage these expectations and accounting quality. The importance of these features is even higher for a new bank. Generally, a full discussion is held with the bank's management to recognize its business objectives, plans and strategies, views on past performance and outlook on the industry. Rating agencies also appraise the attitude of the management to risk taking and containment; the bank's risk management policies such as credit risk, market and operational risk. As well, rating agencies estimate the quality, relevance and depth of information available to the bank's management. The examination of system adequacy includes the quality of the communications network; management information for monitoring performance; systems for accounting control; business development and statutory reporting. They put significant confirmation on the effectiveness of the bank's risk management systems and strategic planning systems (ICRA ratings, 2011).

2.9.5 Risk Management

The assessment of risk management in banks provides an important guidance for the future liquidity, profitability, asset quality and capitalization. The risk management of the bank is estimated for credit risk, market risk and operational risk. The credit risk is the risk of loss resulting from the failure of a client or counterparty to meet its contractual obligations. The market risk is the risk of loss that comes from changes in market variables, mostly stemming from investment portfolio. The operational risk is the risk of loss resulting from inadequate or failed internal processes, systems and people, or from external causes(ICRA ratings, 2011).

2.9.6 Financial Performance

Financial performance investigation is one of the key factors used to compare a bank's performance. The key parameters that rating agencies, such as ICRA[3] use are: Asset Quality: The asset quality of a bank is a sign of its risk appetite; depth of its franchise and effectiveness of its

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[3] ICRA Limited (ICRA) is an Indian independent and professional investment information and agency. It was established in 1991, and was originally named Investment Information and Credit Rating Agency of India Limited (IICRA India). It is second largest Indian rating company in term of customer base. It was a joint-venture between Moody's and various Indian commercial banks and financial services companies. The company changed its name to ICRA Limited, and went public on 13 April 1997.

management, strategy, systems and processes. Asset quality holds the potential to affect earnings and capital .They estimate the quality of a bank's credit appraisal process and lending or investment norms; the riskiness of its loan mix; the accessibility of data to facilitate credit decision-making and its track record in managing its loan book through lifecycles. As well, the level of diversification is also a key indicator of a bank's asset quality. The common factors in assessing diversification include portfolio granularity, loan mix, geographical diversification and borrower profile. Regional and segmental non-performing assets (NPA) analysis is executed to gauge the degree of the bank's credit concentration to a single company, group, industry or region. High levels of diversification can protect a bank from the impact of downturn in any one segment. All at once, diversification into riskier segments may not improve resilience and then, could not interpret into greater ratings. However, a bank's ability to manage diversification, especially in multiple businesses is as vital issue as management depth and ability to adopt the techniques and skills needed to run different businesses. Furthermore, taking into account asset classification, the advances are classified into standard and non-performing assets. NPAs are further classified into substandard, doubtful and loss assets, depending on the time period for which an asset has been an NPA. The provisioning

requirements against provisions made by the bank plus the expected quantum and time frame of recovery are observed by rating agencies. The accent is on estimating prospects of recovery, or further deterioration, that eventually affects the bottom line and financial position of the bank. Vital asset quality indicators for a bank are its fresh NPA generation rate, net NPA percentage, gross NPA percentage (ICRA ratings, 2011).

2.9.7 Liquidity

The liquidity of the bank is captured by rating agencies through analyzing the following qualitative and quantitative factors. First, market perceptions of the bank, Perceptions affect the ability of a bank to access funds during a crisis. A conductor of such perceptions might be relative cost of funds for a bank in the inter-bank market. Second, the degree of the bank's reliance on volatile funds in relation to total assets. Some short-term funding sources are more sensitive to adverse developments than others. Inter-bank funding by domestic banks and domestic deposits by non-bank depositors in downward order of confidence are observed by rating agencies. Committed lines of liquidity available that include revolving lines of credit and refinance facilities. Also, the overall match between the maturity profile of assets

and liabilities measures the liquidity position of the bank(Christiansen et al.,2004).

2.9.8 Earning Stability and Prospects

A bank's ability to make adequate returns is significant from the perspective of its shareholders as well as debt holders. The aim of the evaluation here is to assess the extent of future earnings and quality of earnings of the bank by analyzing its fee income, interest spreads, operating expenses and credit costs. Analyzing a bank's interest spreads its liquidity position and its overall strategy to assess its profitability. After evaluating the income stream, the operating efficiency of the bank (operating expenses in relation to total assets and cost-to-income ratio) is estimated by the rating agencies. Finally, the foundation of the bank's asset quality profile and the profitability indicators give an estimation of the credit costs compared across peers. Significantly, a very high return on equity may not be essentially interpreted into a high credit rating, given that the underlying risk could be very high or leveraging could be excessive as well; and this is could be more difficult to predict (Moody's ratings,1999).

2.9.9 Capital Adequacy

When earning is the first level of protection to debt holders, Capital provides the second level .Therefore, capital quality and adequacy (in relation to the embedded credit, market and operational risk) is important for ratings. In estimating the bank's true capital in relation to the risks in its business, the following aspects are considered: Regulatory capital, risk-based approach and conformance with prescribed norms. Banks are required to attain and keep the ratio of total capital funds to risk weighted assets. The adequacy of capital is also assessed from other points of view such as risk rating of the portfolio, present and prospective asset quality, risk strategy or risk appetite of the bank and interest rate sensitivity of the balance sheet. The quality of capital and the ability to raise it indicates a higher percentage of core Tier I capital . Also, the internal capital generation capacity of the bank is estimated by the rating agency (ICRA ratings, 2011).

2.9.10 Summary

This chapter discussed the main concepts of credit ratings and the evolution of credit rating agencies. It clarified the parties who are interested in credit ratings such as investors, intermediaries, issuers and financial institutions. Also, it provided an introduction to the factors that are considered in the rating process which are mainly related to business risk and financial risk. Chapter three summarizes the most important studies about credit ratings.

Chapter Three

Empirical Studies

Chapter Three
Empirical Studies

3.1 Introduction

This chapter reviews a number of studies that analyze the determinants of credit ratings. Many studies clarify the methodologies used in credit ratings. This section presents a review of the empirical literature on credit ratings.

3.2 Previous studies

Adams et al. (2003) investigate the determinants of external credit ratings attained by insurance firms in the United Kingdom (UK) and the probability that insurers will have such an assessment. Using panel data relating to A.M. Best-rated and Standard and Poor's (S&P) rated insurers over the period (1993–1997), an ordered probit model and a trichotomous logit model with sample selection are employed. The results indicate that the factors which influence the likelihood of having external credit assessments not only vary between the two agencies but also differ from those which determine the ratings themselves. Also, the results show that there is a statistically significant positive effect of

capital adequacy, liquidity, profitability and size on the ratings of S&P and A.M Best .

Amato and Furfine (2004) investigate the influence of the state of the business cycle on credit ratings. In particular, they estimate whether rating agencies are excessively procyclical in their assignment of ratings. The analysis was based on a model of ratings determination that takes into account factors that measure the business and financial risks of firms, in addition to the indicators of the macroeconomic conditions. By utilizing annual data on all US firms rated by Standard & Poor, they find that ratings do not generally exhibit excess sensitivity to the business cycle.

Hsieh (2005) presents a hybrid mining approach in the design of an effective credit scoring model, based on clustering and neural network techniques. Two real world credit data sets from the UCI Repository of Machine Learning Databases[4] were used to test the prediction accuracy of the credit scoring models. They use clustering techniques to preprocess the input samples with the objective of indicating

[4] The UCI Machine Learning Repository is a collection of databases, domain theories, and data generators that are used by the machine learning community for the empirical analysis of machine learning algorithms. The archive was created in 1987 by David Aha and fellow graduate students at UC Irvine.

unrepresentative samples into isolated and inconsistent clusters, and use neural networks to construct the credit scoring model. The clustering stage involves a class-wise classification process. A self-organizing map clustering algorithm was used to automatically determine the number of clusters and the starting points of each cluster. Then, the K-means clustering algorithm was used to generate clusters of samples belonging to new classes and eliminate the unrepresentative samples from each class. In the neural network stage, samples with new class labels were used in the design of the credit scoring model. The proposed method demonstrated by two real world credit data sets .Thus, the hybrid mining approach can be used to build effective credit scoring models.

Mirkovic and Ragunathan (2006) examine the effect that various industry and financial variables have on credit ratings issued for Australian firms by Standard and Poor's. The ordered probit model indicates that leverage ratios and interest coverage have the most pronounced effect on credit ratings. Industry concentration measures and profitability variables were also important. They also document a consistent trend towards lower ratings. These results serve to corroborate similar evidence from U.S. markets presented by Blume, Lim and Mackinlay (1998). Financial variables are helpful in

discriminating between A- and BBB-rated firms, but are less precise in separating AA- and A-rated firms.

Abdou et al.(2007) aim to evaluate credit risk in Egyptian banks using credit scoring models. Their data consists of 581 personal loans with 433 good loans and 148 bad loans. The study uses three statistical techniques, discriminant analysis, probit analysis and logistic regression. The results reveal that all proposed models gave a better average correct classification rate than the one used in practice.

Pasiouras et al. (2007) investigate whether it is possible to develop a multicriteria decision model to replicate the credit ratings of Fitch on Asian banks. The ratings correspond to October 2004, while the financial data correspond to end 2003 . Following a tenfold cross validation procedure, the model was developed with the Multi-group Hierarchical DIScrimination (MHDIS) approach .Five financial variables were selected from a list of 19 ones through factor analysis. Also an additional set of five non-financial variables covering corporate governance , ownership, strength of bank's franchise , auditing and its banking environment was being used. The results reveal that equity to customer and short term funding (EQFUND), return on average equity (ROAE)and net interest margin(NIM) are the most important financial

variables. The number of subsidiaries, the number of shareholders and the banking environment of the country where the banks operate are the most important non-financial ones. Also, the results show that the MHDIS model can replicate the credit ratings of Fitch with a satisfactory accuracy and is more efficient than discriminate analysis and ordered logistic regression that are used for comparison objectives.

Shiu and Chiang (2008) investigate the relationship between the financial strength ratings of Lloyd's syndicate and their determinants. Lloyd's market plays an important role in the global insurance business. Using the Lloyd's market data on syndicates financial strength ratings and their financial information for the period from 2004 through 2007, they examine the determinants of the syndicates letter ratings assigned by Standard & Poor's. An ordered probit regression is utilized to carry out the empirical analysis. The results show that concentration index, leverage, and reinsurance are negatively related to financial strength ratings, while profit, liquidity, growth rate and size have a positive impact on the ratings.

Afonso et al.(2009) compare three procedures to estimate the determinants of sovereign ratings under an ordered response framework: ordered probit, ordered logit and random effects ordered probit. The

panel data set includes information on rating notations for two of the main rating agencies (Standard and Poor's and Moody's), covering 66 countries between 1996 and 2005. Of the three procedures, the study find that the most efficient method is the random effects ordered probit estimation.

Chiu et al. (2010) use the data envelopment analysis to measure the efficiency of banks before and after credit rating is taken into consideration and the Malmquist Productivity Index[5] is employed to measure the total factor productivity changes from 2001 to 2003. The results show that there is a positive relationship between the efficiency scores and credit rating, so the credit rating can be a representative to evaluate the performance and the quality of the bank; also they use the Wilconxon nonparametric two-sample test to check the influences of credit rating on the bank efficiency . The empirical results show that the credit rating is found to influence the efficiency of banks. In addition, the efficiency scores improve in both investment grade (above tw BBB_) and speculation grade (under tw BBB_), when credit rating is taken into consideration. The empirical results show that the efficiency

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[5] The Malmquist index measures the Total Factor Productivity (TFP) change of a Decision Making Unit (DMU) between two different time periods by calculating the ratio of the distances under a specific technology.

scores of banks with a high credit rating improved relatively more when compared to banks with a lower credit rating; finally, the research adopts the Malmquist index to observe the productivity and efficiency changes from a year to another. They acquire results whereby the improvement of efficiency may be influenced greatly both from pure technical and scale efficiency changes.

Bissoondoyal-Bheenick and Treepongkaruna (2011) test the quantitative determinants of bank ratings, provided by Standard & Poor's, Moody's, and Fitch in the United Kingdom and Australia. The ratings used in this study are for the period (2006–2009).The final sample of commercial banks for which ratings across the ratings agencies were available includes 20 commercial banks from Australia and 49 others from the UK. The main finding is that the quantitative factors that reflect asset quality, liquidity risk, operating performance and capital adequacy are the key determinants of bank ratings across the rating agencies. However, macroeconomic variables and market risk factors do not seem to be contributing factors in explaining bank ratings in either countries.

Chan et al.(2011) examine the main empirical predictions of Boot, Milbourn and Schmeits (2006) model (Boot model) that predicts certain credit rating events are likely to be more informative than others and

that credit watch procedure are an important driver of such differences. The sample embraces U.S. corporate issuer credit ratings provided by Moody's, over the period(1990–2006). From an initial sample exceeding 100,000 events, the cases are eliminated to arrive at a sample of 611 watch negatives, 1,745 straight downgrade, 576 watch-preceded downgrades, and 226 confirmations. Findings fail to find any conclusive evidence for the hypothesis that watch procedures might be used to coordinate investor beliefs where firms face multiple equilibria in relation to their investment choices. Moreover, they are unable to conclude that watch procedures increase the amount of information that credit rating agencies release to the market because they find that downgrades that follow a watch procedure are neither more nor less informative than downgrades with no prior watch procedure. The evidence does provide support for the alternative view that ratings agencies are always at an informational advantage relative to investors, given that rating announcements tend to be informative on average.

Apergis et al. (2012) examine the impact of Standard and Poor's credit ratings on U.S banks. The sample of the initial credit rating includes 4,043 firm-year observations for which data was available for 370 financial entities over the period 1989 to 2009. Specifically, the study investigates the impact of upgrades and downgrades on six comprehensive bank's asset

classes, profitability, leverage and size for one and two years horizon after the rating change. The outcomes indicate that in the one year horizon after a rating change an upgrade results in an increase in net loans and profitability. The finding reflects a fall in the price of wholesale funding, combined with increased loan market shares for these banks. A downgrade, however, resulted in an increase in loss allowance and other real estate owned, providing evidence that downgraded banks attempt to reduce their loan portfolio risk and cleanse bad loans. Turning to the two year horizon after a rating change, upgraded banks continued to exhibit higher profitability and increase in size. Downgraded banks continue to increase their loss provisions, while they improve their liquidity position. Though, there is evidence for an increase in their leverage and size, confirmed by a number of robustness checks. The findings suggest that a downgrade has a lasting and relatively more severe impact on banks than an upgrade; yet, downgraded banks do not seem to effectively reduce their appetite for risk over a longer horizon. The findings point to the increased role for supervisors responsibility in deterring banks risk taking behavior especially for downgraded banks and evaluating the banks performance towards the goal of a sound financial system.

Chen (2012) proposes an integrated procedure to analyze the determinants of credit ratings, classify credit ratings and provide meaningful decision rules for interested parties. The experimental focus is the Asian banking industry. Asia is at the front of global economic growth, even though its investment environment is very risky and uncertain. Data were restored from a BankScope[6] database that covers 1327 Asian banks, Observations in the BankScope dataset cover the period 1993–2007 .This study adopts an integrated feature-selection approach to select key attributes, and then adopts an objective cumulative probability distribution approach (CPDA) to partition selected condition attributes by applying rough sets local-discretization cuts. This paper then applies the rough sets LEM2 algorithm to generate a comprehensible set of decision rules. Finally, this paper utilizes a rule filter to eliminate rules with poor support and thereby improves rule quality. Experimental results demonstrate that the proposed procedure is an effective method of removing irrelevant attributes and achieving increased accuracy, providing a knowledge-based

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[6] The Bankscope database is a comprehensive, global database containing 16 years of detailed financial information, including balance sheets, income statements, ratings, ratios, news, peer analysis, statistical analysis, and ownership and subsidiary information for 29,000 public and private banks in Europe, North America,Japan, Russia, and other countries. Bureau van Dijk Electronic Publishing (BvDEP), one of the world’s leading publishers of electronic business and company information, created the Bankscope database for use by multinationals. The Bankscope database also contains the bank credit and country ratings of major credit rating agencies, including those of S&P, Moody’s, and Fitch.

system for classification of rules and for solving credit-rating problems encountered by banks, thereby benefiting interested parties.

Chen and Cheng (2013) show that issuers and investors need a credit rating indicator to help them identifying the financial status and the competence of banks. A credit rating provides financial entities with an evaluation of credit worthiness, default probability , and investment risk. Although numerous models have been proposed to solve credit rating problems, they have drawbacks for example ,lack of explanatory power; numerous variables, which result in multiple dimensions and complex data; and reliance on the restrictive assumptions of statistical techniques. To overcome these shortcomings, this study applies two hybrid models that solve the practical problems in credit rating classification. For model verification, this study uses an experimental dataset collected from the Bankscope database over the period 1998–2007. Experimental results demonstrate that the proposed hybrid models for credit rating classification outperform the listed models in this work. A set of decision rules for classifying credit ratings was extracted.

Dash and Das (2013) compare the performance of public sector banks with private-foreign banks under the CAMELS framework (based on the evaluation of five critical elements of a financial institution's operations: Capital adequacy, Asset quality, Management soundness, Earnings and profitability, and Liquidity). The data used for the study were the audited financial statements of a sample of 58 Indian banks which 29 were public sector banks, and 29 were private sector-foreign banks for the period 2003-2008.The financial variables and financial ratios based on the CAMELS framework, used in the analysis were: Tier I capital, Tier II capital, and capital adequacy ratio (for capital adequacy); gross non-performing assets, net non-performing assets, and net non-performing assets to total advances ratio (for asset quality); total investments to total assets ratio, total advances to total deposits ratio, business per employee, and profit after tax per employee (management soundness); return on net worth, operating profit to average working fund ratio, profit after tax to total assets ratio (for earnings and profitability); government securities to total investments ratio and government securities to total assets ratio (for liquidity); and beta (for sensitivity to market risk).The results show that private/foreign banks fared better than public sector banks on most of the CAMELS factors in the study period. The two contributing factors for the better performance of

private/foreign banks are Management Soundness and Earnings and Profitability.

Hau et al. (2013) attempt to examine the quality of credit ratings assigned to banks by the three largest rating agencies (Standard and Poor's, Moody's and Fitch) over the period 1990 to 2011. They define a new ordinal metric of rating error based on banks expected default frequencies, and interpret credit ratings as relative assessments of creditworthiness. The results suggest that on average large banks receive more positive bank ratings, particularly from the agency to which the bank provides substantial securitization business. These competitive distortions are economically significant and contribute to perpetuate the existence of 'too-big-to-fail' banks. They also show that, overall, differential risk weights recommended by the Basel accords for investment grade banks bear no significant relationship to empirical default probabilities.

Gogas et al. (2014) aim to present an empirical model designed to forecast bank credit ratings using only quantitative and publicly available information from their financial statements. They use the long-term ratings provided by Fitch in 2012. The sample consists of 92 US banks and publicly available information in annual frequency from their

financial statements over the period (2008 -2011). In order to select the most informative regressor from a long list of financial variables and ratios, they use stepwise least squares and select several alternative sets of variables. Afterward, these sets of variables are used in an ordered probit regression setting to forecast the long-term credit ratings. The results reveal that the best model that reaches an 83.70 percent forecasting accuracy is the one that contains nine financial variables. Five of these nine forecasting regressors come from the bank's balance sheets, three are performance ratios and one comes from the income statement.

Murcia et al. (2014) attempt to identify the determinant factors of credit rating in Brazil. The sample comprised a total of 153 credit rating observations issued to companies operating in Brazil during the period 1997-2011 by two major global agencies: Standard & Poor’s and Moody’s. The study built a Generalized Estimating Equations (GEE) model using a panel structure with credit rating as the dependent variable and ten other independent variables, namely: leverage, profitability, size, financial coverage, growth, liquidity, corporate governance, control, financial market performance, and internationalization. The empirical results show that five variables are

statistically significant: leverage, profitability, growth, financial market performance, and internationalization.

3.3 What distinguishes this study from previous studies?

The importance of this study comes from being (to the best of research's knowledge) the first study in Jordan that suggests a model to forecast credit ratings of banks based on publically available financial data over a relatively long period of time (2000-2013) . Moreover , the importance of this study is that it is considered the first one in Jordan that determines the factors that affect the banks credit ratings, and specifically Moody's credit ratings of Jordanian commercial banks.

3.4 Summary

This chapter summarized the most related studies which investigate the factors that affect credit ratings in a number of countries and for several rating agencies and over different periods of time. Most of them conclude that the CAMEL factors significantly affect the credit ratings of different agencies. Chapter four presents the data and methodology of the study.

Chapter Four

Data and Methodology

Chapter Four
Data and Methodology

4.1 Introduction

This chapter presents our methodology and data. It gives an introduction on the financial variables and ratios. In addition, it explains the ordered probit regression model which is used in our study to forecast the credit ratings of the Jordanian commercial banks.

4.2 Methodology

Bank ratings are based on five main areas of fundamental analysis, namely capital adequacy, asset quality, management, earnings and profitability, funding and liquidity (CAMEL). According to Moody's (2002a), capital is an important indicator for bank solvency and helps to support confidence among investors by offering a cushion against losses. Asset quality is central to bank solvency and therefore is important for maintaining confidence among investors. Management quality, the most challenging category to capture qualitative characteristics, such as attitude towards risks, experience and integrity, which directly affect the bank's efficiency and riskiness. Earnings capacity relates to the franchising value and the profitability of the bank.

It is the first line of defence for debtholders in periods of stress and is considered by Moody’s as the cornerstone of bank credit assessment. Liquidity is relevant to bank credit assessment because banks are susceptible to loss of confidence and sudden withdrawals of funds. Due to the maturity transformation role that banks perform and their high levels of leverage and intrinsic opaqueness, liquidity problems may become funding problems and even lead to insolvency (Moody’s ratings,2002). Based on that, our study uses a similar approach, the financial variables that are investigated in our study are, profitability, asset quality, liquidity, capital adequacy and size. Indeed, the methodology of the study is based on estimating an ordered probit regression model for the Jordanian banks to get a credit score for each bank over the period (2000-2013) and to determine the factors that significantly affect credit ratings.

4.2.1 Population and sample

The population of the study includes all the commercial banks in Jordan. The sample of the study consists of the financial reports of 13 commercial banks in Jordan over the period (2000-2013).The data will be obtained from Amman Stock Exchange.

4.2.2 Variables of the Study

4.2.2.1 Dependent Variables

The credit score is the dependent variable in the current study. It is constructed on a yearly basis, every bank is given a rank ranging from 1 to 13 according to Moody's ratings which is obtained from the Association of Banks in Jordan .

4.2.2.2 Independent Variables

The independent variables in the current study consist of seven ratios that measure profitability: net interest margin, net interest revenue to average total assets, pre-tax operating income to average total assets, return on average assets, return on average equity, dividend payout, cost to income ratio; two measures of asset quality: loan loss reserves to gross loans, loan loss provisions to net interest revenue; five measures of liquidity: loans to total assets, loans to deposits ratio, loans to deposits and borrowings, liquid assets to deposits, liquid assets to deposits and borrowings; three measures of capital adequacy: equity to total assets, equity to loans, equity to deposits, and finally the logarithm of total assets as a measure of size, and the logarithm of the age as a measure of the age of the bank.

4.2.3 Definitions of Variables

According to (Moody's, 2011), and (Poon et al, 2005) the definitions and explanations of the study variables are as follows:

4.2.3.1 Profitability Variables

1. Net Interest Margin (NIM)

The net interest margin is defined as the ratio of the net interest income to the average total earning assets. The net interest income equals interest income minus interest expense. On the other hand, the earning assets consist of liquid assets (mainly cash and balances with central bank, due from banks, trading and available-for-sale securities), non-liquid assets (mainly other financial assets designated at fair value, held-to-maturity investments and gross loans) and the interest-earning components of other assets(Moody's, 2011).

2. Net Interest Income / Average Total Assets (NIMA)

This ratio is calculated as the net interest income to the average total assets of the bank.(Gogas,2014)

3. Pre-Tax Operating Income / Average Total Assets (PROA)

This ratio is calculated as the ratio of the pre-tax operating income to the average total assets of the bank (Poon et al, 2005).

4. Return on Average Assets (ROA)

The ROA is calculated as the percentage of net income to the average total assets of the bank (Gogas,2014).

5. Return on Average Equity (ROE)

The ROE is calculated as the percentage of net income to the average equity of the bank(Poon et al, 2005).

6. Dividend Payout Ratio (DPO)

This ratio is calculated as the ratio of the dividend per share to the earning per share (Poon et al, 2005).

7. Cost to Income Ratio (CTI)

This ratio is calculated as the ratio of the total operating expense to the net revenue. The operating expense or other operating (non-interest) expense consists of personnel expense, administrative and other operating expense, and depreciation and amortization. The personnel

expense consists of salaries and employee benefits, pension benefits, and other personnel expenses. Also, the administrative and other operating expense consists of net occupancy and equipment, professional fees, (gain) loss on sale of property, plant and equipment and other assets, merger-related and restructuring charges, loss on early extinguishment of debt, taxes other than income taxes, and other operating expense. On the other hand, the net revenues consist of net interest income (expense) and non-interest income. The net interest income (expense) equals interest income minus interest expense. The non-interest income consists of net fees and commissions, foreign exchange income, income from trading activities/gains (losses) on financial instruments through profit and loss, gain/(loss) arising from investment securities, net gains (losses) on financial instruments designated at fair value through profit and loss and gross dividends from investment securities (Poon et al, 2005) (Moody's, 2011).

4.2.3.2 Asset Quality Variables

1. Loan Loss Reserves / Gross Loans (LLRGL)

This ratio is calculated as the percentage of the loan loss reserves to the gross loans. Where gross loans equals loan loss reserves plus loans.

The loan loss reserves (allowance for loan losses) are calculated as the sum of any specific, generic and other types of allowances for loan losses, which might also include those that have been temporarily created in addition to generic and specific (Moody's, 2011).

2. Loan Loss Provisions / Net Interest Revenue (LLPNIR)

This ratio is calculated as the loan loss provisions to the net interest revenues. The loan loss Provisions are calculated by adding provisions for credit losses, releases of provisions and recoveries, direct write-off of loans and advances and other loan loss provisions (Moody's, 2011).

4.2.3.3 Liquidity Variables

1. Loans to Total Assets (LTA)

This ratio is calculated as the percentage of the loans to the total assets of the bank (Gogas,2014).

2. Loans to Deposits Ratio (LTD)

This ratio is calculated as the percentage of the loans to the customer and short-term funding of the bank (Poon et al, 2005).

3. Loans / Total Deposits and borrowings (LTDB)

This ratio is calculated as the percentage of the loans to the total deposits and borrowings of the bank.

Then, the total deposits are calculated by adding customers deposits, and banks & financial institutions deposits (Poon et al, 2005).

4. Liquid Assets / Customer and Short-Term Funding(LATD)

This ratio is calculated as the percentage of the liquid assets to the customer and short-term funding. The liquid assets consist of cash and balances with central bank, due from other financial institutions, trading securities, available-for-sale securities, other securities, and unearned income from securities(Poon et al, 2005).

5. Liquid Assets / Total Deposits and Borrowings (LATDB)

This ratio is calculated as the percentage of the liquid assets to the total deposits and borrowings (Poon et al, 2005).

4.2.3.4 Capital Adequacy Variables

1. Equity to Total Assets (ETA)

This ratio is calculated as the ratio of the book value of equity to the total assets of the bank. The book value of equity equals shareholder's equity minus preferred stock. Also, the shareholder's equity as reported by the bank, comprises of common stock and treasury stock, capital surplus, retained earnings, revaluations, minority interest and other components of Shareholder's Equity (Poon et al, 2005)(Gogas,2014).

2. Equity to Loans (ETL)

This ratio is defined as the percentage of the book value of equity to the loans of the bank (Moody's,2011).

3. Equity to Customer and Short-term Funding (ETD)

This ratio is calculated as the percentage of the book value of equity to the customer and short-term funding (Poon et al, 2005)..

4.2.3.5 Size

The size of the bank is measured by the logarithm of the total assets(Gogas,2014).

4.2.3.6 Age

The age of the bank is defined as the Logarithm of the years of the bank age (Poon et al, 2005).

Table (4.1) presents the summary of definitions of these variables and the codes assigned to them.

Table (4.1)

The definitions of the study variables

Variable code	**Variable name and Brief Explanation**
Profitability	
NIM	Net interest margin =net interest income/average total earning assets
NIMA	Net interest income/average total assets
PROA	Pre-tax operating income/average total assets
ROA	Return on average assets =net income/average total assets
ROE	Return on average equity =net income/average equity
DPO	Dividend Payout
CTI	Cost to income ratio =overheads/(net interest revenue+ other operating income)
Asset Quality	
LLR/GL	Loan loss reserves(LLR)/gross loans (where gross loans=loans+ LLR)
LLP/NIR	Loan loss provisions(LLP)/net interest revenue
Liquidity	
LTA	Loans to total assets
LTD	Loans/customer and short-term funding (loans to deposits ratio)
LTDB	Loans/total deposits and borrowings
LATD	Liquid assets/customer and short-term funding
LATDB	Liquid assets/total deposits and borrowings
Capital Adequacy	
ETA	Equity to total assets =book value of equity/total assets
ETL	Equity to loans =book value of equity/loans
ETD	Equity to customer and short-term funding =book value of equity/ customer and short-term funding
Size	
LNASSET	Logarithm of total assets
Age	
LNAGE	Logarithm of Years of bank age

*Source: prepared by the researcher.

4.2.4 Model

In statistics, a probit model is a type of regression where the dependent variable is a dummy variable that can only take two values, one or zero. The name is from the words probability and unit. The purpose of the model is to estimate the probability that an observation with particular characteristics will fall into one of the two categories. On the other hand, the selection of the ordered probit model is based on the nature of the dependent variable which is discrete and ordinal that is the credit ratings. Thus, the dependent variable in the ordered probit model is a dummy variable that falls into one of three categories or more. The ordered probit model takes into account the differences between the categories of the dependent variable. For example, the difference between the rating categories 0 and 1 is not the same as 1 and 2. Thus, it is the most appropriate econometric methodology to forecast credit ratings (McKelvey and Zavoina, 1975; Trevino and Thomas, 2000). In an ordered probit model the dependent variable represents ordered observations or in other words a ranking variable(Gogas et al.,2014).

The dependent variable in our study is modeled by a latent variable Y^* that has a linear relation with a vector of explanatory variable X_i , with parameter vector β, and an error term e_i as follows:

$Y^{*} = X_i \beta + e_i$

Where:

Y^{*}= an unobserved latent variable which represents the credit score

X_i = a vector of explanatory variables

β= a vector of parameter

e_i = random error

Typically, Y^{*} is unobserved. What is observed are the historical Moody's credit ratings, which range from 1 to 13 over the period(2000-2013). The forecasted y_i is fitted from Y^{*} where :

$y_i = 1$ if $Y^* \leq u_1$

$y_i = 2$ if $u_1 < Y^* \leq u_2$

$y_i = 3$ if $u_2 < Y^* \leq u_3$

$y_i = 4$ if $u_3 < Y^* \leq u_4$

...

$y_i = 13$ if $Y^* > u_{12}$

This is a form of interval decision rule. The u's are threshold values (or cut points) that define the ranges of credit score (i.e., 1, 2, ... 13); which are estimated by stata.

The explanatory variables consist of seven ratios that measure profitability, two measures of asset quality, five measures of liquidity, three measures of capital adequacy, and one measure of size. Also, the age of the bank is included in the explanatory variables. The following model represents them:

$Y^{*}= \beta_1 NIM+ \beta_2 NIMA+ \beta_3 PROA+ \beta_4 ROA+ \beta_5 ROE+ \beta_6 DPO+ \beta_7 CTI+$

$\beta_8 LLRGL+ \beta_9 LLPNIR+ \beta_{10} LTA+ \beta_{11} LTD+ \beta_{12} LTDB+ \beta_{13} LATD+ \beta_{14} LATDB+ \beta_{15} ETA+ \beta_{16} ETL+ \beta_{17} ETD+ \beta_{18} LNASSET+ \beta_{19} LNAGE+ e_i$

Where:

Y^{*}= an unobserved latent variable which represents the credit score

β= a vector of parameter

NIM= net interest revenue to average total earning assets, NIMA=net interest revenues to average total assets, PROA= pre-tax operating income to average total assets, ROA= return on average assets, ROE= return on average equity, DPO = dividends per share to earnings per share, CTI= total operating expense to net revenue, LLRGL= loan loss reserves to gross loans, LLPNIR= loan loss provisions to net interest revenue, LTA= loans to total assets, LTD= loans to customer and short-

term funding, LTDB= loans to total deposits and borrowings, LATD= liquid assets to customer and short-term funding, LATDB= liquid assets to total deposits and borrowings, ETA= book value of equity to total assets, ETL= book value of equity to loans, ETD= book value of equity to customer and short-term funding , LNASSET= logarithm of the total assets, LNAGE= logarithm of the years of the bank age.

e_i = random error

Then, the probability of having each value of y_i is estimated as follows:

$Prob(1) = \Phi\ (u_1-\beta x)$,

$Prob(2) = \Phi\ (u_2-\beta x) - \Phi\ (u_1-\beta x)$,

…

$Prob(13) = 1- \Phi\ (u_{12}-\beta x)$.

Where, Φ is the cumulative function of a normal distribution.

Thereafter, the maximum log-likelihood function is used to estimate the marginal probabilities (the marginal values of y_i with the beta coefficients). Stata pursue the credit ratings of the banks according to the forecasted y_i values.

4.2.5 Hypotheses of the study

In this study we investigate six hypotheses as the following:

H1: There is a statistically significant positive effect of Profitability ratios on banks credit rating.

H2: There is a statistically significant positive effect of asset quality ratios on banks credit rating.

H3: There is a statistically significant positive effect of liquidity ratios on banks credit rating.

H4: There is a statistically significant positive effect of capital adequacy ratios on banks credit rating.

H5: There is a statistically significant positive effect of size on banks credit rating.

H6: There is a statistically significant positive effect of age on banks credit rating.

4.3 Summary

This chapter presented the data and methodology of the study. Our methodology is mainly based on using an ordered probit model to determine the factors that affect the credit ratings of the Jordanian commercial banks over the period (2000-2013) and to estimate a forecasted credit rating for them . Chapter five presents the results and the discussions of the study findings.

Chapter Five

Results and Discussion

Chapter Five

Results and Discussion

5.1 Introduction

This chapter presents the estimation results of the study and discusses its findings. It starts with the descriptive statistics of the study variables, thereafter the results of the ordered probit model and the banks ratings are presented.

5.2 Descriptive Statistics

Table (5.1) presents a summary descriptive statistics of the independent variables. The descriptive statistics cover the period (2000-2013). As presented in Table (5.1), we calculated the minimum, maximum, mean and standard deviation for all 19 independent variables.

Table (5.1)
Summary of descriptive statistics*

Variables	Mean	Median	Max	Min	SD
Age	42.2308	37.0000	83.0000	17.0000	16.4166
Size	2940000000	914000000	24500000000	53385252	5560000000
NIM	0.0280	0.0278	0.0745	0.0076	0.0084
NIMA	0.0272	0.0276	0.0433	0.0021	0.0080
PROA	0.0168	0.0180	0.0607	-0.0407	0.0119
ROA	0.0124	0.0134	0.0497	-0.0548	0.0099
ROE	0.1031	0.0958	0.3984	-0.2547	0.0728
DPO	0.3121	0.2932	1.2305	0.0000	0.3049
CTI	0.5570	0.3751	0.8765	0.1376	0.3840
LLRGL	0.0742	0.0556	0.9182	0.0040	0.0882
LLPNIR	0.2116	0.1440	2.5452	-0.4028	0.3050
LTA	0.8876	0.4324	47.4800	0.0028	4.3869
LTD	1.5061	0.5836	67.1900	0.0040	7.1750
LTDB	0.5754	0.5717	0.9799	0.0038	0.1555
LATD	0.4420	0.4450	0.8855	0.1890	0.1290
LATDB	0.4341	0.4358	0.8855	0.1807	0.1320
ETA	0.1156	0.1205	0.2196	-0.3135	0.0577
ETL	0.5842	0.2774	55.5980	-0.5324	4.1024
ETD	0.1608	0.1610	0.3348	-0.3839	0.0814

*Source: prepared by the researcher based on Stata.

This table reports the descriptive statistics of the study variables. Age denotes the age of the bank, size denotes the logarithm of the total assets of the bank, NIM denotes the net interest margin ratio, NIMA=net interest revenues to average total assets PROA= pre-tax operating income to average total assets, ROA= return on average assets, ROE= return on average equity, DPO = dividends per share to earnings per share, CTI= total operating expense to net revenue, LLRGL= loan loss reserves to gross loans, LLPNIR= loan loss provisions to net interest revenue, LTA= loans to total assets, LTD= loans to customer and short-term funding, LTDB= loans to total deposits and borrowings, LATD= liquid assets to customer and short-term funding, LATDB= liquid assets to total deposits and borrowings, ETA= book value of equity to total assets, ETL= book value of equity to loans, ETD= book value of equity to customer and short-term funding .

The profitability ratios show different means. The NIM shows a mean of (0.0280), its maximum value estimated to be (0.0745) and minimum value equals (0.0076).The NIMA displays a mean equals (0.0272) , its maximum value is estimated to be (0.0433) and the minimum value equals (0.0021). The PROA shows a mean of (0.0168), a maximum value of (0.0607) and a minimum value of (-0.0407). The mean of ROA equals (0.0124) , the maximum value equals (0.0497) and the minimum value equals (-0.0548). The ROE displays a mean equals (0.1031), its maximum value equals (0.3984) and minimum value equals (-0.2547). DPO has a mean equals (0.3121) , with a maximum value of (1.2305) and a minimum value of(0.0000). The CTI shows a mean of (0.5570),its maximum value is estimated to be (0.8765) and the minimum value equals (0.1376).

Moreover, regarding to asset quality ratios, the descriptive statistics show that the LLRGL has a mean of (0.0742), its maximum value equals (0.9182) and the minimum value equals (0.0040). The LLPNIR displays a mean of (0.2116), its maximum value is estimated to be (2.5452) and its minimum value equals (-0.4028).

With respect to liquidity ratios, the LTA presents a mean equals (0.8876), Its maximum value equals (47.4800) and the minimum value equals (0.0028). The mean of LTD is (1.5061), the maximum value is

(67.1900) and the minimum value is (0.0040). The LTDB displays a mean of (0.5754) , its maximum value equals (0.9799) and its minimum value equals (0.0038). The mean of LATD is (0.4420), the maximum value is (0.8855) and the minimum value is (0.1890).The LATDB shows a mean of (0.4341), a maximum value of (0.8855) and a minimum value of (0.1807).

In addition, regarding to capital adequacy ratios, the mean of ETA equals (0.1156), the maximum value equals (0.2196) and the minimum value equals (-0.3135). The ETL shows a mean of (0.5842), its maximum value equals (55.5980) and its minimum value equals (-0.5324) .The mean of ETD is (0.1608), the maximum value is (0.3348) and the minimum value is (-0.3839).

The average Age of the banks in our sample equals (42.2308), its maximum value equals (83) and its minimum value equals (17). The mean of Size equals (2940000000), its maximum value is estimated to be (24500000000) and its minimum value equals (53385252).

5.3 Correlation Matrix

Table (5.2) shows the correlation matrix between the variables of the study. In general the profitability ratios show high positive correlation between each others, such as the correlation between ROE and ROA that equals (57%). Similarly, the correlation between PROA and ROA is (93%). Thus, a correlation value higher than 80% would cause a multicollinearity problem (Gujarati,2012). Accordingly, PROA will be excluded when estimating the ordered probit model. Additionally, the correlation between ROE and PROA equals (59%). The correlation between NIM and NIMA is (81%). Similarly, in order to avoid the multicollinearity problem NIMA will be excluded when estimating the ordered probit model. Also, the correlation between ETD and ETA is (95%). Accordingly , ETD will be excluded when estimating the ordered probit model. The correlation between LATDB and LATD is (99%). Similarly, in order to avoid the multicollinearity problem LATDB will be excluded when estimating the ordered probit model.

Table (5.2)

Summary of Correlation Matrix*

	CTI	DPO	ETA	ETD	ETL	LATD	LATDB
Age	0.0175	0.1744	-0.0393	-0.1088	0.0387	0.1647	0.2053
Size	-0.4258	0.3781	0.1340	0.1438	-0.1074	-0.2471	-0.2352
CTI	1.0000	-0.2780	-0.5104	-0.5294	-0.0598	-0.5533	-0.5798
DPO	-0.2780	1.0000	0.2351	0.1669	-0.0666	-0.1289	-0.1064
ETA	-0.5104	0.2351	1.0000	0.9490	0.0770	-0.2264	-0.2559
ETD	-0.5294	0.1669	0.9490	1.0000	0.0816	-0.2160	-0.2645
ETL	-0.0598	-0.0666	0.0770	0.0816	1.0000	0.0406	0.0302
LATD	-0.5533	-0.1289	-0.2264	-0.2160	0.0406	1.0000	0.9916
LATDB	-0.5798	-0.1064	-0.2559	-0.2645	0.0302	0.9916	1.0000
LLPNIR	0.5980	-0.1818	-0.2896	-0.3190	-0.0740	0.0923	0.1098
LLRGL	0.4691	-0.2007	-0.2867	-0.2846	0.7066	0.2488	0.2550
LTA	0.0615	0.0037	0.0389	0.0429	-0.0140	0.0662	0.0704
LTD	-0.1051	0.0237	0.1082	0.1124	-0.0118	-0.1264	-0.1290
LTDB	-0.2434	-0.1859	0.0393	0.2028	-0.2838	-0.3596	-0.3768
NIM	-0.4816	0.2050	0.2089	0.2329	0.4109	-0.4197	-0.4239
NIMA	-0.3304	0.1968	0.1997	0.1248	0.0830	-0.4176	-0.4138
PROA	-0.6538	0.1180	0.4252	0.3928	0.0911	-0.2489	-0.2726
ROA	-0.6755	0.1153	0.3993	0.4245	0.0683	-0.2324	-0.2516
ROE	-0.3619	0.0434	-0.1255	-0.0875	0.0229	-0.0871	-0.0919

*Source: prepared by the researcher based on Stata

	LLPNIR	LLRGL	Age	Size	LTA	LTD	LTDB
Age	-0.1622	0.0741	1.0000	0.4964	0.0128	-0.0041	-0.2757
Size	-0.1717	-0.3476	0.4964	1.0000	-0.1430	0.0055	-0.0398
CTI	0.5980	0.4691	0.0175	-0.4258	0.0615	-0.1051	-0.2434
DPO	-0.1818	-0.2007	0.1744	0.3781	0.0037	0.0237	-0.1859
ETA	-0.2896	-0.2867	-0.0393	0.1340	0.0389	0.1082	0.0393
ETD	-0.3190	-0.2846	-0.1088	0.1438	0.0429	0.1124	0.2028
ETL	-0.0740	0.7066	0.0387	-0.1074	-0.0140	-0.0118	-0.2838
LATD	0.0923	0.2488	0.1647	-0.2471	0.0662	-0.1264	-0.3596
LATDB	0.1098	0.2550	0.2053	-0.2352	0.0704	-0.1290	-0.3768
LLPNIR	1.000	0.2332	-0.1622	-0.1717	-0.0447	-0.0541	-0.1281
LLRGL	0.2332	1.0000	0.0741	-0.3476	0.0434	-0.0673	-0.3432
LTA	-0.0447	0.0434	0.0128	-0.1430	1.0000	0.2810	0.0451
LTD	-0.0541	-0.0673	-0.0041	0.0055	0.2810	1.0000	0.0011
LTDB	-0.1281	-0.3432	-0.2757	-0.0398	0.0451	0.0011	1.0000
NIM	-0.3397	0.0646	0.0176	0.1426	0.0048	0.0623	0.2596
NIMA	-0.2602	-0.0238	0.0252	-0.0230	0.0423	0.0528	0.2909
PROA	-0.4460	-0.2640	-0.1737	0.0895	-0.0392	0.0470	0.1713
ROA	-0.4809	-0.2960	-0.1615	0.1707	-0.0273	0.0352	0.2092
ROE	-0.2934	-0.1066	-0.0531	0.1426	-0.0504	-0.0202	0.1042

Supplement of table (5.2)

	NIM	NIMA	PROA	ROA	ROE
Age	0.0176	0.0252	-0.1737	-0.1615	-0.0531
Size	0.1426	-0.0230	0.0895	0.1707	0.1426
CTI	-0.4816	-0.3304	-0.6538	-0.6755	-0.3619
DPO	0.2050	0.1968	0.1180	0.1153	0.0434
ETA	0.2089	0.1997	0.4252	0.3993	-0.1255
ETD	0.2329	0.1248	0.3928	0.4245	-0.0875
ETL	0.4109	0.0830	0.0911	0.0683	0.0229
LATD	-0.4197	-0.4176	-0.2489	-0.2324	-0.0871
LATDB	-0.4239	-0.4138	-0.2726	-0.2516	-0.0919
LLPNIR	-0.3397	-0.2602	-0.4460	-0.4809	-0.2934
LLRGL	0.0646	-0.0238	-0.2640	-0.2960	-0.1066
LTA	0.0048	0.0423	-0.0392	-0.0273	-0.0504
LTD	0.0623	0.0528	0.0470	0.0352	-0.0202
LTDB	0.2596	0.2909	0.1713	0.2092	0.1042
NIM	1.0000	0.8121	0.4229	0.3617	0.2798
NIMA	0.8121	1.0000	0.4113	0.2224	0.1679
PROA	0.4229	0.4113	1.0000	0.9307	0.5943
ROA	0.3617	0.2224	0.9307	1.0000	0.5693
ROE	0.2798	0.1679	0.5943	0.5693	1.0000

Supplement of table (5.2)

Table (5.2) reports the correlation values between the study variables. Age denotes the age of the bank, Size denotes the logarithm of the total assets of the bank, NIM denotes the net interest margin ratio, NIMA=net interest revenues to average total assets PROA= pre-tax operating income to average total assets, ROA= return on average assets, ROE= return on average equity, DPO = dividends per share to earnings per share, CTI= total operating expense to net revenue, LLRGL= loan loss reserves to gross loans, LLPNIR= loan loss provisions to net interest revenue, LTA= loans to total assets, LTD= loans to customer and short-term funding, LTDB= loans to total deposits and borrowings, LATD= liquid assets to customer and short-term funding, LATDB= liquid assets to total deposits and borrowings, ETA= book value of equity to total assets, ETL= book value of equity to loans, ETD= book value of equity to customer and short-term funding .

5.4 Ordered Probit Model

Table (5.3) reports the estimation results of the ordered probit model.

Table (5.3)
Summary of ordered probit model results *

Variables	Coef.	Std. Err.	z	P>z
Age	0.1265	0.3900	0.3200	0.7460
Size	4.4310	0.3768	11.7600	0.0000
NIM	190.5569	63.3062	3.0100	0.0030
ROA	105.8644	47.6419	2.2200	0.0260
ROE	1.2896	1.7546	0.7300	0.4620
DPO	0.4453	0.3825	1.1600	0.2440
CTI	-5.8605	0.8218	-7.1300	0.0000
LLRGL	10.3765	3.0020	3.4600	0.0010
LLPNIR	1.3181	0.3760	3.5100	0.0000
LTA	0.0231	0.0080	2.9000	0.0040
LTD	-0.0095	0.0035	-2.7400	0.0060
LTDB	-3.5230	1.5538	-2.2700	0.0230
LATD	20.7829	8.7086	2.3900	0.0170
ETA	54.6818	11.7735	4.6400	0.0000
ETL	9.9618	2.7566	3.6100	0.0000
Pseudo R2 = 0.5282				

*Source: prepared by the researcher based on Stata.

Table (5.3) reports the ordered probit model results. Age denotes the age of the bank, Size denotes the logarithm of the total assets of the bank, NIM denotes the net interest margin ratio, ROA= return on average assets, ROE= return on average equity, DPO = dividends per share to earnings per share, CTI= total operating expense to net revenue, LLRGL= loan loss reserves to gross loans, LLPNIR= loan loss provisions to net interest revenue, LTA= loans to total assets, LTD= loans to customer and short-term funding, LTDB= loans to total deposits and borrowings, LATD= liquid assets to customer and short-term funding, ETA= book value of equity to total assets, ETL= book value of equity to loans.

The results of the ordered probit model show the following:

- There is a statistically significant positive relationship between the NIM and the bank credit rating. Thus, the higher NIM the higher the probability for the bank to have a higher credit rating.
- There is a statistically significant positive relationship between the ROA and the bank credit rating. Thus, the bank with a higher ROA is more likely to have a higher credit rating.
- There is no statistically significant relationship between the ROE and the credit rating of the bank.
- There is no statistically significant relationship between the DPO and the bank credit rating.
- There is a statistically significant negative relationship between the CTI and the bank credit rating. Thus, the lower CTI the higher the probability for the bank to have a higher credit rating.
- In general, the profitability ratios show a highly significant positive effect on the credit rating of the bank. Accordingly, we accept the first hypothesis "There is a statistically significant positive effect of Profitability ratios on banks credit rating'' .

- There is a statistically significant positive relationship between the LLRGL and the bank credit rating. Consequently, the bank with a higher LLRGL is more likely to have a higher credit rating.
- There is a statistically significant positive relationship between the LLPNIR and the bank credit rating. Thus, a higher LLPNIR increases the probability for the bank to have a higher credit rating.
- The asset quality ratios in general show a significant positive effect on the credit rating of the bank. Accordingly, we accept the second hypothesis "There is a statistically significant positive effect of asset quality ratios on banks credit rating."
- There is a statistically significant positive relationship between the LTA and the bank credit rating. Therefore, a higher LTA increases the probability for the bank to have a higher credit rating.
- There is a statistically significant negative relationship between the LTD and the bank credit rating. Hence, a lower LTD increases the probability for the bank to have a higher credit rating.
- There is a statistically significant negative relationship between the LTDB and the bank credit rating. Thus, the bank with a higher LTDB is less likely to have a higher credit rating.

- There is a statistically significant positive relationship between the LATD and the bank credit rating. Therefore, a higher LATD increases the probability for the bank to have a higher credit rating.
- In general, the liquidity ratios show a significant positive effect on the credit rating of the bank. Therefore, we accept the third hypothesis "There is a statistically significant positive effect of liquidity ratios on banks credit rating."

  Our findings are in harmony with (Shiu and Chiang ,2008), who find evidence suggesting that profit, liquidity, and size have a positive impact on the ratings. Their study focus on the Lloyd's market.
- There is a statistically significant positive relationship between the ETA and the bank credit rating. Therefore, the bank with a higher ETA is more likely to have a higher credit rating.
- There is a statistically significant positive relationship between the ETL and the bank credit rating. Consequently, a higher ETL increases the probability for the bank to have a higher credit rating.
- In general, the capital adequacy ratios show a significant positive effect on the credit rating of the bank. Accordingly, we accept the fourth hypothesis "There is a statistically significant positive effect of capital adequacy ratios on banks credit rating."

- There is a statistically significant positive relationship between the Size and the bank credit rating. Consequently, a higher Size increases the probability for the bank to have a higher credit rating. Accordingly, we accept the fifth hypothesis “There is a statistically significant positive effect of size on banks credit rating.”

  Our results are consistent with (Adams et al., 2003),who find evidence suggesting that the ratings of S&P and A.M Best (credit rating agencies) are positively linked to capital adequacy, liquidity , profitability , and size. Their study focuses on the insurance industries in UK.

- There is no statistically significant relationship between the Age and the credit rating of the bank. Therefore , we reject the sixth hypothesis “There is a statistically significant positive effect of age on banks credit rating.”

- The overall R^2 of the model is 53%. Thus, the examined ratios in the model explains 53% of the probability of having a higher credit rating.

5.5 Marginal effects

Table (5.4) shows the marginal effects of the variables of the study on the credit rating.

Table (5.4)
Summary of Marginal Effects *

Variables	dy/dx	Std z	p>z	X
Age	0.0000	0.3200	0.7460	3.6683
Size	0.0156	11.7600	0.0000	20.8267
NIM	0.0063	3.0100	0.0030	0.0280
ROA	0.0032	2.2200	0.0260	0.0124
ROE	0.0001	0.7300	0.4620	0.1031
DPO	0.0000	1.1600	0.2440	0.3121
CTI	-0.0088	-7.1300	0.0000	0.5570
LLRGL	0.0076	3.4600	0.0010	0.0740
LLPNIR	0.0008	3.5100	0.0000	0.2116
LTA	0.0009	2.9000	0.0040	0.8876
LTD	-0.0043	-2.7400	0.0060	1.5061
LTDB	-0.0023	-2.2700	0.0230	0.5754
LATD	0.0021	2.3900	0.0170	0.4420
ETA	0.0078	4.6400	0.0000	0.1156
ETL	0.0069	3.6100	0.0000	0.5842

*Source: prepared by the researcher based on Stata.

Table (5.4) reports the marginal effects. Age denotes the age of the bank, Size denotes the logarithm of the total assets of the bank, NIM denotes the net interest margin ratio, ROA= return on average assets, ROE= return on average equity, DPO = dividends per share to earnings per share, CTI= total operating expense to net revenue, LLRGL= loan loss reserves to gross loans, LLPNIR= loan loss provisions to net interest revenue, LTA= loans to total assets, LTD= loans to customer and short-term funding, LTDB= loans to total deposits and borrowings, LATD= liquid assets to customer and short-term funding , ETA= book value of equity to total assets, ETL= book value of equity to loans.

The estimated results of the marginal effects of the study variables on the credit rating show the following :

- The increase in NIM, and ROA by 1% will increase the probability of the bank of having a higher credit rating by 0.0063, and 0.0032 respectively .In contrast , the decrease in CTI by 1% will increase the probability of the bank of having higher credit rating by 0.0088. This result is consistent with (Gray et al., 2006), who study the credit rating of Australian firms, and find that profitability ratios are greater for the firms with higher credit ratings.
- The increase in LLRGL, and LLPNIR by 1% will increase the probability of the bank of having higher credit rating by 0.0076, and 0.0008 respectively.
- The rise in LTA ,and LATD by 1% will increase the bank probability of having a higher credit rating by 0.0009 , and 0.0021 respectively. On the other hand, the decrease in LTD, and LTDB by 1% will increase the probability of the bank of having higher credit rating by 0.0043, and 0.0023 respectively.
- The increase in ETA and ETL by 1% will increase the probability of the bank of having higher credit rating by 0.0078 and 0.0069 respectively.

- The increase in Size by one will increase the probability of the bank of having higher credit rating by 0.0156.

  Our results are consistent with (Apergis et al., 2012) , who study the credit ratings of U.S banks. Their results show that upgraded banks are positively related to profitability , size, and liquidity.

5.6 Predicted Credit Rating for Jordanian Commercial Banks

Table (5.5) displays a predicted credit rating for the Jordanian commercial banks estimated in stata according to the marginal effects (changes in the probability) estimated by the ordered probit model variables.

Table (5.5)
The forecasted credit ratings of the Jordanian commercial banks *

Name of The Bank	Forecasted Rating
ARAB BANK	1
THE HOUSING BANK FOR TRADE AND FINANCE	2
JORDAN AHLI BANK	3
JORDAN KUWAIT BANK	4
BANK OF JORDAN	5
CAIRO AMMAN BANK	6
BANK AL ETIHAD	7
CAPITAL BANK OF JORDAN-JORDAN	8
JORDAN COMMERCIAL BANK	9
INVEST BANK	10
ARAB BANKING CORPORATION -JORDAN	11
ARAB JORDAN INVESTMENT BANK	12
SOCIETE GENERALE DE BANQUE - JORDANIE	13

*Source: prepared by the researcher.

The credit rating indicates that the Arab Bank, the Housing Bank For Trade and Finance and the Jordan Ahli Bank, are the first three banks in Jordan in terms of their credit worthiness. Arab Banking Corporation - Jordan, Arab Jordan Investment Bank, and Societe Generale ,are the last three banks in Jordan in terms of their credit worthiness. Other banks are in between the two categories.

5.7 Summary

This chapter discussed the estimation results of the ordered probit model, which indicate the importance of the profitability ratios, liquidity ratios, capital adequacy ratios, asset quality ratios, age and size in forecasting the credit ratings of the Jordanian commercial banks. Chapter six summarizes the main conclusions of the study and the recommendations for future research.

Chapter Six

Conclusions and Recommendations

Chapter Six
Conclusions and Recommendations

6.1 Conclusions

This study investigates the factors that affect the credit ratings of the Jordanian commercial banks over the period (2000-2013) using an ordered probit model. Moreover, the study estimates a forecasted credit rating of the banks investigated. The results show that profitability ratios, asset quality ratios, liquidity ratios, capital adequacy ratios and the size of the bank have statistically significant effects on the banks credit ratings. The forecasted credit rating puts the Arab bank, the Housing Bank for Trade and Finance and Jordan Ahli Bank as the first three banks in Jordan in terms of their credit worthiness. The findings of the study are summarized as follows:

- The profitability ratios of the Jordanian commercial banks have a statistically significant effect on its credit rating. In specific, the ordered probit model shows that the higher the return on assets, the net interest margin, the net interest revenue to average total assets,

and the lower the cost to income ratio the more the probability for the bank to have a higher credit rating.

- The asset quality ratios of the Jordanian commercial banks have a statistically significant effect on its credit rating. Particularly, the results of the ordered probit model indicate that the higher the loan loss reserves to gross loans, and the loan loss provisions to net interest revenue the more likely for the bank to have a higher credit rating.
- The liquidity ratios of the Jordanian commercial banks have a statistically significant effect on its credit rating. Mainly, the results of the ordered probit model show that the higher the loans to total assets, the liquid assets to deposits, and the lower the loans to deposits ratio, and the loans to deposits and borrowings ratio the more the probability for the bank to have a higher credit rating.
- The capital adequacy ratios of the Jordanian commercial banks have a statistically significant effect on its credit rating. In specific, the results of the ordered probit model indicate that the higher the equity to total assets, the equity to loans, and the equity to deposits the more likely for the bank to have a higher credit rating.

- The size of the bank for the Jordanian commercial banks has a statistically significant effect on its credit rating. Thus, the higher the Logarithm of total assets the more the probability for the bank to have a higher credit rating.
- The forecasted credit rating of the Jordanian commercial banks over the period (2000-2013) shows that the Arab Bank, the Housing Bank for Trade and Finance, and the Jordan Ahli Bank are the first three banks in Jordan in terms of their credit worthiness.

6.2 Recommendations and Suggestions for Future Research

Based on our results,

- The study recommends the Jordanian commercial banks to vastly consider their credit ratings because of its importance to investors, depositors, borrowers and many other parties who deal with them.
- The study recommends the Jordanian commercial banks to give a vital consideration to increase its profitability, asset quality, liquidity and capital adequacy ratios because of their significant effect on their credit ratings.

- The study recommends the Jordanian banks to expand because size has a statistically significant effect on the bank's worthiness.
- Future research could consider other factors that could affect the credit rating of the Jordanian banks. For example, the corporate governance factors, and the competitive position of the firm.
- Future research could use other methodologies such as neural networks, data envelopment analysis and stepwise regressions to examine the same research topic.

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الملخص

رند سمير حمارنة . تصنيف ائتماني للبنوك التجارية الاردنية. رسالة ماجستير بقسم العلوم المالية و المصرفية. جامعة اليرموك 2014 . (المشرف: د. ديما وليد حنا الربضي).

تبحث هذه الدراسة في العوامل التي تؤثر على التصنيفات الائتمانية للبنوك التجارية الاردنية خلال الفترة بين (2000-2013) باستخدام النموذج الاحتمالي الترتيبي (ordered probit model) وبالإضافة لذلك ، فإن الدراسة تقدر التصنيف الائتماني المتوقع للبنوك التي تمت دراستها. تظهر النتائج بأن نسب الربحية ونسب جودة الأصول ونسب السيولة ونسب كفاية رأس المال وحجم البنك لها تأثيرات ذات دلالة احصائية هامة على التصنيفات الائتمانية للبنوك . يَضع التصنيف الائتماني المتوقع البنك العربي و بنك الاسكان للتجارة والتمويل و البنك الأهلي الأردني كأفضل أول ثلاثة بنوك في الأردن من حيث الجدارة الائتمانية .

الكلمات المفتاحية: تصنيف ائتماني ، البنوك التجارية الاردنية ، النموذج الاحتمالي الترتيبي ، بورصة عمان للأوراق المالية ، نسب الربحية ، نسب جودة الأصول ، نسب السيولة ، نسب كفاية رأس المال .